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Claims 1-35 are currently pending in the subject application, and are presently under consideration. Claims 1-35 stand rejected. Claims 34 and 35 have been amended to correct typographical errors. Favorable reconsideration of the application is requested in view of the amendments and comments herein.

I.   Rejection of claim 33 under 35 U.S.C. 112, second paragraph

The Office Action has rejected claim 33 contending that the limitation "the other target nodes" recited in Claim 33 lacks sufficient antecedent basis. We respectfully disagree with this contention. Claim 33 depends from claim 30, which explicitly recites, "...receiving non-data responses from other target nodes in the system..." See claim 30, line 5. Since there is sufficient antecedent basis for the term "the other target nodes" as recited in claim 33, Applicant requests that this rejection be withdrawn.

II.   Rejection of claims 1-6, 8-9 and 13 under 35 U.S.C. 103(a)

Claims 1-6, 8-9 and 13 have been rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application No. 2004/0002992 to Cypher ("Cypher") and further in view of U.S. Patent Publication No. 6,922,756 to Hum et al. ("Hum '756"). Applicant traverses this rejection for the following reasons.

The Office Action states that Cypher discloses a system comprising the first node associating an F-state with a copy of the data in response to receiving the copy of the data. However, Cypher fails to teach or suggest a system that includes a node that can associate an F-state with a copy of data as recited in claim 1. For instance, Cypher fails to teach or suggest an F-state in explaining that shared memory multiprocessing systems generally employ broadcast snooping or directory based cache coherency protocols. Furthermore, Cypher is deficient in teaching or suggesting an F-state when describing the systems employing directory based protocols, as identified in the Office Action. See Cypher par. [0007]. Instead, the only mention of cache states in Cypher appear to relate to the modified (M), owned, (O), shared (S) and invalid (I), corresponding to well known MOSI protocol. Cypher at par. [0052]. The other particular sections of Cypher relied on in the Office Action do not appear relevant to claim 1. See Cypher

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at par. [0007] and [0008] which merely briefly discuss how shared memory multi-processing systems can employ either a broadcast snooping cache coherency protocol or a directory based cache coherency protocol. Cypher also fails to teach or suggest a first node operative to provide a source broadcast requesting data, the first node associating an F-state with a copy of the data in response to receiving responses as recited in claim 1. For example, Cypher at par. [0068] (also relied on in the Office Action to reject claim 1) describes directory based point-to-point response to detection of a cache miss. What is the relevance of the teaching at paragraph [0068] to what is recited in claim 1?

The Office Action admits that Cypher fails to teach an F-state capable of responding to request from the other nodes in the system with a shared copy of the data; although it is pointed out that claim 1 actually recites that the F-state enables the first node to serve as an ordering point in the system capable of responding to request from the other nodes in the system with a shared copy of the data. The Office Action relies on Hum '756 as purportedly teaching what is admittedly not taught in Cypher. However, Hum '756 also fails to cure the deficiencies of Cypher relative to the system of claim 1. For example, neither Hum '756 nor Cypher (as discussed above) teach or suggest associating an F-state with a copy of the data in response to receiving the copy of the data from memory and receiving non-data responses from other nodes in the system, the non-data responses including an indication that at least a second node includes a shared copy of the data, as recited in claim 1. In contrast, the F-state mentioned in Hum does not result in the manner claimed, but instead the node can keep the cache line its F-state when a peer node in the E-state responds to a PRL request with a dataF message to the peer node for the data and when the home node responds with an ACK message to a CNCL message from the node that previously held the data in the E state. See Hum '756 at Col. 6, lines 39-60. Therefore, assuming one were to combine the teachings of Cypher and Hum '756, one of ordinary skill in the art would not be motivated to combine the system of Cypher with that of Hum '756 to create the system of claim 1. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 1. Additionally, Applicant requests reconsideration and allowance of claims 2 to 13 which depend from claim 1.

Moreover, Applicant respectfully submits that there is not proper motivation to combine the teachings of Cypher with those of Hum '756. For instance, Cypher relates to a system that

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can select either a broadcast protocol or a point to point protocol according to mode control logic. The Office Action contends that simply because Hum includes a purported teaching (although as discussed above, it does not), an artisan would have been motivated to implement features from Hum into the system of Cypher. However, simply because something that an examiner deems relevant may be taught in a given reference does not provide proper motivation to combine such teaching with another reference. In view of the insufficient basis for motivation to combine and due the divergent teachings in the respective references, Applicant reiterates that it would not have been obvious to one of ordinary skill in the art to combine the system of Cypher with that of Hum '756 to create the system of claim 1. Any conclusion to the contrary appears to have been based on improper hindsight in which the present claim and specification has supplied the missing teaching and motivation. Reconsideration and allowance of claim 1 are respectfully requested.

The reference to Cypher at paragraph [0069] used by the Office Action in rejection of claim 2 seems to be misplaced as this cited section relates to point to point transactions. In contrast, claim 2 depends from claim 1, and claim 1 recites a first node that is operative to provide a source **broadcast** requesting data (emphasis added). Thus, the system of claim 2 recites that the non-data responses include an indication that at least a second node includes a shared copy of the data (from claim 1) and that the other nodes in the system do not have a copy of the data requested by the first node. The system of Cypher fails to teach or suggest a system include such non-data responses in a system according to claim 2. Instead, the sections of Cypher being relied upon disclose a requesting agent 100 that sends a point to point, read to own request to the home node 102, then the home node blocks the new transactions, marks the requestor 100 as the sole owner, sends a request to own transaction to the owning slave agent 103, and invalidates all other slave agents 104 which have a shared copy. See Cypher at par. [0069]. Since the approach being relied upon is a directory-based protocol, Applicant submits that would suggest eliminating the need for responses that the other nodes that do not have a copy because the home node 102 selects node 103 that has a copy and invalidates all other copies. See Cypher at [0069]. For these reasons, Cypher in view of Hum '756 fails to teach or suggest claim 2. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 2.

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The Office Action contends that Cypher discloses claim 3 by citing figure 4 and paragraph [0068]. We disagree with this contention. Paragraph [0068] of Cypher refers to the system in Cypher which uses point to point transactions, not broadcast transactions. Additionally, in contrast to the contention of the Office Action, par [0068], lines 1-9, of Cypher teaches a point to point (not a broadcast) "read to own" request. In sharp contrast, Claim 3 recites that the source broadcast requesting the data comprises a non-ownership request for the data, not a read to own request. Therefore, Cypher in view of Hum '756 fails to teach or suggest claim 3. Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 3.

In regard to claim 4, the Office Action, again cites references to point to point read to own transactions which fail to teach or disclose the non-ownership broadcast read requests recited in claim 4. See Cypher at par. [0068]. Additionally, the general description of protocols described in Cypher used in shared memory multiprocessing systems fails to teach or suggest a non-ownership request comprises a source broadcast read request. See Cypher at [0007]. Applicant submits that the record is deficient in teaching or suggesting what is recited in claim 4. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 4.

In the rejection of claim 13, the Office Action contends that Cypher discloses that the ordering point defined by the F-state migrates from the first node to another node. We disagree with this contention. For instance, how can the Office Action now contend that Cypher teaches or suggests F-state after admitting that claimed features associated with such state are missing from Cypher as applied to claim 1. Additionally, where does Cypher to teach or suggest that ordering points migrate? As stated in support of claim 1, Cypher fails to teach or suggest that an F-state enables a node to server as an ordering point. Significantly, Cypher is silent on associating an F-state with a node in the manner recited in claim 1 to enable the node to operate in the manner recited, let alone the migration of the ordering point defined by the F-state, as recited in claim 13. See Cypher at par. [0075] and [0076]. In sharp contrast, Cypher teaches that "various ordering points are established within the node" and that "a client may serve as an ordering point." See Cypher at par. [0075]. Hum similarly is deficient relative to the system of claim 13 for at least the same reasons mentioned above with respect to claim 1. For these reasons, Applicant respectfully requests reconsideration and allowance of claim 13.

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III.   <u>Rejection of claims 7, 10, 31 and 35 under 35 U.S.C. 103(a)</u>

Claims 7, 10, 31 and 35 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Cypher in view of Hum '756 and further in view of U.S. Patent Application Publication No. 2004/0123047 to Hum et al. ("Hum '047"). Applicant traverses this rejection for the following reasons.

The Office Action contends that claim 7 is unpatentable over Cypher in view of Hum '756, further in view of Hum '047. We respectfully disagree with this contention. As stated in support of claim 1, Cypher in view of Hum '756 fails to teach or suggest the system of claim 1 from which claims 6 and 7 depend. Additionally, Hum '047 fails to cure the cited deficiencies of Cypher in view of Hum '756 in teaching claim 7. Specifically, there exists no basis from Hum '047 that the mention of silent eviction described therein could be implemented by a cache controller for data stored in cache lines by modifying state information from an F-state to an invalid state, as recited in claim 7. Instead, Hum '047 only describes silent eviction of a shared copy - nothing suggests it contemplates an F-state. Hum '047 at par. [0065]. Accordingly, this rejection appears to be clear application of hindsight analysis as the neither the Office Action nor any combination of the three references being applied seem to provide any motivation to create the system of claim 7. Therefore, the prior art of record fails to teach or suggest claim 7. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 7.

For reasons similar to those stated in support of claim 1, and 7, claim 10 is patentable over the prior art cited in the Office Action. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 10.

For reasons similar to those stated in support of claims 1, 7, and 10, claim 31 is patentable over the prior art cited in the Office Action. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 31.

In rejecting claim 35, the Office Action states that Cypher discloses sending an instruction from the source node having the F-state to block the home node from responding with data to a subsequent non-ownership request for the data. We disagree with this contention. As stated in support of claim 13, Cypher fails to disclose a system including the F-state. See Cypher at par. [0070]. Additionally, Cypher fails to disclose that a source node sends an instruction to

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block the home node from responding with data to a subsequent non-ownership request. In sharp contrast to the contention of the Office Action, it is the home agent in the cited example of Cypher that may block the requests, but Cypher fails to teach that the source node may block the home node from responding with data to a subsequent non-ownership request, as recited in claim 35. See Cypher at par. [0070], lines 4 to 6. Instead, Cypher teaches that an agent already having a shared copy of the data sends a read to own request to the home agent and the home agent blocks further requests by invalidating the other shared copies of the data and marks the source node as the sole owner of the data. See Cypher at par. [0070]. Therefore, Cypher and Hum '756, further in view of Hum '047 fail to teach or suggest claim 35. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 35.

IV.   **Rejection of claims 11, 12, 14-15, 17-21, 23-30 and 32-34 under 35 U.S.C. 103(a)**

Claims 11, 12, 14-15, 17-21, 23-30 and 32-34 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Cypher in view of Hum '756 and further in view of U.S. Patent Publication No. 6,138,218 to Arimilli et al. ("Arimilli"). Applicant traverses this rejection for the following reasons.

The Office Action concedes that to Cypher in view of Hum '756 fail to teach or suggest claim 11. The Office Action then contends that Arimilli cures the deficiencies of Cypher in view of Hum '756 in disclosing claim 11. We disagree with this contention. The reliance on Arimilli at Col. 6, lines 39 to 64, seems to be misplaced as this section of Arimilli fails to teach or suggest transferring from a source broadcast protocol to an associated forward progress protocol in response to a request failing in the source broadcast protocol. Instead, Arimilli teaches moving the coherency state of a requested cache item toward the expected coherency state at the completion of the original operation. See Arimilli at col. 6, lines 39 to 45. However, nothing in Arimilli suggests that this change of coherency state involves a transfer to a forward progress protocol, as recited in claim 1. Significantly, the objects of the invention specifically recite that the invention is for handling snoop operations in multiprocessor systems. Moreover, Arimilli also fails to cure the previously stated deficiencies of Cypher in view of Hum '756 in teaching claim 1 from which claim 11 depends. Since Cypher in view of Hum '756 and further in view of Arimilli fails to disclose claim 11, Applicant respectfully requests reconsideration and allowance of claim 11.

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For reasons similar to those given in support of claim 11, dependent claim 12 is patentable over Cypher in view of Hum '756 and further in view of Arimilli. Applicant respectfully requests reconsideration and allowance of claim 12.

The Office Action admits that Cypher and Hum '756 fail to teach or suggest various features recited in claim 14. The purported reliance on Cypher and Hum '756 is deficient for the reasons stated above with respect to claims 1 and 3. For instance, as stated in support of claims 1 and 3, Cypher and Hum fail to teach or suggest that a second node becomes an ordering point of the system in response to receiving the shared copy of the data at least because Cypher and Hum fail to teach or suggest that ordering points migrate. Additionally, Arimilli fails to teach or suggest the interrelationships between responses, requests and states that occur in the system of claim 14, including a failure to teach or suggest that the second node becomes an ordering point in the network. See. Arimilli at col. 5 line 60 to col. 6 line 15. The discussion of the push operation that results in forcing a state change involves pushing the data to system memory, which is in contrast to what is recited in claim 14, where shared data is transferred between nodes and where the second node transitions to a third state in response to receiving the shared copy of data from the first node, such that the second node becomes an ordering point in the network for providing a shared copy of the data, as recited in claim 14. Since the combined teachings of Cypher and Hum '756 with Arimilli collectively fail to provide a teaching or suggestion regarding what is recited in claim 1, one ordinarily skilled in the art would not be motivated to create the system of claim 14 based on such teachings. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 14 as well as dependent claims 15 to 19.

Claim 19 has been amended to correct an inadvertent typographical error by reciting that third state and the first state are the same. The Office Action's reliance on Arimilli appears misplaced. In particular, where does Arimilli teach or suggest that the first state and third state are the same? See Arimilli col. 3, lines 17 to 25, which describes data from a modified state pushing data to system memory or if in a different state, changing its state to shared or invalid. In contrast, claim 14, from which claim 19 depends, recites that the first state indicates that the data is shared with memory (not a modified state) and that the first state causes the first node to respond to a non-ownership request from the second node. Since Cypher and Hum '756 in view

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of Arimilli fail to teach or suggest the network of claim 14 wherein the third state and the second state are the same, Applicant respectfully requests reconsideration and allowance of claim 19.

For similar reasons to those stated in support of claims 1 and 14, the prior art references Cypher, Hum '756, and Arimilli, either independently or in combination fail to teach or suggest claim 20. The Office Action uses the rationale presented in the rejection of claim 1 to reject claim 20, this rational is deficient in teaching both claims 1 and 20. The Office Action cites paragraphs [0007], [0008], [0068] of Cypher in the rejection of claim 1, and claim 20. However, as discussed above with respect to claim 1, the general description of broadcast based protocols (Cypher par. [0007]), directory based protocols (Cypher par. [0008]), and the general description of directory based point-to-point transactions of Fig. 8A (Cypher par. [0068]) fail to teach or suggest the system of claim 20. Moreover, the citation to the system of Fig. 8A seems misplaced as it refers to a point-to-point transaction and not a broadcast request for desired data, as recited in claim 20. See Cypher at par. [0068]. Additionally, in the system of Fig 8A, the source agent 100 receives the data from the home node 102 and no other messages. See Cypher at par. [0068] and Fig. 8A. This is in sharp contrast to the system of claim 20 in which the source processor transitions from the first state to a second state in response to receiving the responses from the memory and the at least one target processor.

Moreover, the sections of Hum '756 cited in the rejection of claim 1 fail to cure the deficiencies of Cypher in teaching or suggesting claim 20. For example, Hum '756 at paragraph [0007] teaches the use of a Forward (F) state for cache coherency in a multi-node system. Then Hum '756 describes the F-state as a "first among equals" notion in the context where there exists a valid copy of requested data in memory and further teaches that the owned copy of data may be eliminated. However, Hum '756 still fails to teach or suggest the source processor transitioning from the first state to a second state in response to receiving the response form the memory and at least one target processor, the second state enabling the first processor to respond to requests from the plurality of processors with a copy of the desired data, as recited in claim 20.

Then the Office Action admits that Cypher and Hum '756 fail to teach claim 14, but contends that Arimilli cures the deficiencies of Cypher and Hum '756 in teaching claim 14. For the reasons previously stated in support of claim 14, Arimilli also fails to cure the previously stated deficiencies of Cypher and Hum relative to claim 20. For example, Arimilli fails to teach

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or suggest that the source processor transitions from the first state to a second state in response to receiving the responses form the memory and the at least one target processor. Instead, Arimilli teaches that the push operation allows other devices (not the source device) within the system which have the requested cache item in the hovering state to update the data associated with the address tag for the requested cache item, such that the requested cache item transitions to a shared state in the local memory. See Arimilli at col. 5 lines 60 to 67. For these reasons, Cypher, Hum '756 and Arimilli, either separately or in combination fail to teach or suggest claim 20. Accordingly, Applicant requests reconsideration and allowance of claim 20. Additionally, Applicant requests reconsideration and allowance of dependant claims 21 to 25.

In regard to claim 21, the Office Action contends that Cypher discloses claim 21. We respectfully disagree with this contention. The Office Action cites the system of Fig. 8 in paragraph [0069] of Cypher in the rejection of claim 21. However, this reliance on Cypher seems misplaced as it describes a non-broadcast point-to-point (PTP) transaction between a home node 102, source node 100, slave agent 103, and other slave agents 104. The operation of this system is in sharp contrast to claim 21 because none of the other nodes (102, 103 or 104's) responds to the broadcast request with a response indicating that the at least one other processor does not include a valid copy of the desired data, as recited in claim 1. For example, in the system of Cypher the requesting agent (source node) 100 sends a PTP read to own (RTO) request to the home node, then the home node sends a RTO to the current owner node 103. Cypher at par. [0069]. Since Cypher, in view of Hum '756, further in view of Arimilli fails to teach or suggest claim 21, Applicant respectfully requests reconsideration and allowance of claim 21.

For reasons similar to those stated in support of claims 1, 3, and 20, Cypher in view of Hum '756, further in view of Arimilli fails to teach or suggest Claim 23. Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 23.

For reasons similar to those stated in support of claim 4 and 20, Cypher in view of Hum '756, further in view of Arimilli fails to teach or suggest Claim 24. Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 24.

The Office Action relies on the rational for the rejection of claim 11 in the rejection of claim 25. For similar reasons to those stated in support of claim 11, this rational is also deficient

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in the rejection of claim 25. For example, Cypher, Hum '756, and Arimilli all fail to teach or suggest the system of claim 20 wherein upon failure of a broadcast request, the system transfers to an associated forward progress protocol. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 25.

The Office Action relies on the rational from rejecting claim 20 to reject claim 26. Applicant submits that the rationale applied to claim 20 does not render claim 26 obvious for the reasons stated above with respect to claim 20. Claims 27-29 are patentable for at least the same reasons.

For reasons similar to those stated in support of claim 11 and 20, Cypher in view of Hum '756, further in view of Arimilli fails to teach or suggest Claim 28. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 24.

The Office Action contends that Cypher in view of Hum '756, further in view of Arimilli discloses claim 29. We disagree with this contention. For example, Cypher fails to disclose that a home node for the requested data, the system further comprising means from blocking the home node from responding with the data to another request. In sharp contrast, the Office Action cites a section of Cypher which teaches that a request agent upon detecting a cache miss, transmits read to own coherency request to the home client 102 which may supply the requested data directly to the requesting client. Therefore, since Cypher and Hum, in view of Arimilli fails to teach or disclose claim 29, Applicant respectfully requests reconsideration and allowance of claim 29.

For reasons similar to those state in support of claim 1, 20 and 26, Cypher in view of Hum '756, further in view of Arimilli fails to teach or suggest claim 30. Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 30.

The Office Action contends that Cypher discloses moving the ordering point for the data from the source node to another in claim 32. We disagree with this contention. For reasons similar to those stated in 27, claim 32 is patentable over Cypher, Hum '756 and Arimilli. None of the prior art references teach or suggest that ordering points move. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 32.

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For similar reasons to those stated in support of claims 1, 20, 30 and 5, claim 33 is patentable over Cypher and Hum '756, further in view of Arimilli. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 33.

Claim 34 is patentable over Cypher, Hum '756 and Arimilli at least for the reasons given in support of claim 11. Accordingly, Applicant respectfully requests withdraw of the rejection of claim 34.

V. Rejection of claims 16 and 22 under 35 U.S.C. 103(a)

Claims 16 and 22 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Cypher in view of Hum '756, Arimilli and further in view Hum '047 Applicant traverses this rejection for the following reasons.

The Office Action uses the rational used for claim 10 in the rejection of claim 16. This rational is deficient in the rejection of claim 16 for reasons similar to those stated in support of claim 1, 7, and 10. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 16.

The Office Action uses the rational used for claim 10 in the rejection of claim 16. This rational is deficient in the rejection of claim 16 for reasons similar to those stated in support of claim 1, 7, 10 and 16. Accordingly, Applicant respectfully requests reconsideration and allowance of claim 22.
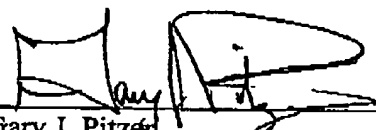
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VI. Conclusion

In view of the foregoing remarks, Applicant respectfully submits that the present application is in condition for allowance. Applicant respectfully requests reconsideration of this application and that the application be passed to issue.

Should the Examiner have any questions concerning this paper, the Examiner is invited and encouraged to contact Applicant's undersigned attorney at (216) 621-2234, Ext. 106.

No additional fees should be due for this response. In the event any fees are due in connection with the filing of this document, the Commissioner is authorized to charge those fees to Deposit Account No. 08-2025.

Respectfully submitted,

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